

E X T O X N E T

Extension Toxicology Network

A Pesticide Information Project of Cooperative Extension Offices of Cornell University, Michigan State University, Oregon State University, and University of California at Davis. Major support and funding was provided by the USDA/Extension Service/National Agricultural Pesticide Impact Assessment Program.

Pesticide
Information
Profile

Hexazinone

Publication Date: 9/93

TRADE OR OTHER NAMES

Trade names for products containing hexazinone are DPX 3674 and Velpar. It may be used in combination with other herbicides such as bromacil and diuron.

INTRODUCTION

Hexazinone is a triazine herbicide used against many annual, biennial and perennial weeds as well as some woody plants. It is mostly used on non-crop areas; however, it is used selectively for the control of weeds among sugar cane, pineapples, and lucerne. Hexazinone is a systemic herbicide that works by inhibiting photosynthesis in the target plants. Rainfall or irrigation water is needed before it becomes activated.

Hexazinone is a general use pesticide.

TOXICOLOGICAL EFFECTS

ACUTE TOXICITY

Hexazinone has a very low acute toxicity. However, it carries the signal word DANGER-WARNING due its ability to cause serious and irreversible eye irritation. In rats, the oral LD50 of hexazinone is 1,690 mg/kg and in male guinea pigs is 860 mg/kg. The lethal dose in beagle dogs is greater than 3,400 mg/kg. The dermal LD50 for rabbits is greater than 5,278 mg/kg. Hexazinone is not a significant skin irritant nor does it cause skin sensitization in guinea pigs. It may irritate the eyes, nose and throat, in humans. Another symptom of acute toxicity noted for humans is vomiting (7).

Rats exposed to hexazinone at very high concentrations in air for one hour experienced no mortality.

CHRONIC TOXICITY

Over a two-week period rats given moderate doses of hexazinone in their food showed no evidence of cumulative toxicity. Rats and dogs fed high doses of the compound for 90 days

showed decreased body weight. The highest dose that resulted in no toxicity is about 50 mg/kg for dogs. Very high doses for eight weeks did not affect hamsters and caused only increased liver weights in mice.

Reproductive Effects

Female rats, fed moderate to high doses (up to 150 mg/kg) over three generations, showed no effects on reproduction or milk production. The weight of the pups was reduced only at the highest dose administered.

Teratogenic Effects

Female rats receiving low to moderate doses (10 to 250 mg/kg/day) during gestation produced no malformations in the fetuses. Fetal weight was significantly lower only at the highest dose. Pregnant rabbits fed hexazinone within this same range of doses on days 6 through 19 of gestation showed no significant differences from the controls. The fetus was also unaffected (2). It is unlikely that hexazinone would pose a serious threat to a developing fetus.

Mutagenic Effects

Hexazinone is not mutagenic as indicated by a variety of tests on bacteria and mammalian cells. Thus, it is not likely to pose a mutagenic threat to humans.

Carcinogenic Effects

Rats and mice were tested for two years on diets containing up to 500 mg/kg (10,000 ppm). Hexazinone was not carcinogenic in either species in either of two studies. These studies suggest that hexazinone is unlikely to be carcinogenic to humans though the EPA has not classified the carcinogenicity of the compound.

Organ Toxicity

A single moderate dose of hexazinone in rabbit eyes caused severe irritation. It took nearly a month for the eyes to return to normal. With lower doses, the eyes were irritated but returned to normal in 3 days.

Fate in Humans and Animals

Almost all of a 14 mg/kg oral dose administered to rats was excreted in three to six days, with the majority in urine. In another study, animals fed 125 mg/kg for two weeks then given a small single dose, excreted almost all of the product within three days. Less than 1% of the parent hexazinone was detected in urine and feces. There does not appear to be any significant tissue accumulation (2).

Dairy cows given small amounts of hexazinone in their diets for 30 days had no detectable residues in milk, fat, liver, kidney, or lean muscle but did have minute amounts of a hexazinone metabolite in their milk. Lactating goats given small amounts of hexazinone for five days also had small amounts of the compound in their milk. The goats had a small amount of the parent compound in their liver (1). Hens fed very low doses for four weeks had no residues in eggs, skin, muscle, fat or liver.

ECOLOGICAL EFFECTS

The LD50 of hexazinone in bobwhite quail is 2258 mg/kg. The LC50 of hexazinone in bobwhite quail and mallard ducklings is greater than 10,000 ppm. This indicates that hexazinone is practically non-toxic to birds.

Hexazinone is only slightly toxic to fish and other freshwater organisms. Some of the aquatic 96-hour LC50 values include: rainbow trout 320 ppm, bluegill 370 ppm, fathead minnow 274 ppm. The LC50 for hexazinone in the water flea, *Daphnia magna*, is 151. The compound is non-toxic to bees. It is not expected to bioaccumulate in aquatic systems.

The herbicide is toxic to larch trees (*Larix* spp.) and should not be used for weed control in forested areas ([6](#)).

ENVIRONMENTAL FATE

Half of the applied herbicide is lost in soil after one to six months depending on the climate and soil type. Hexazinone is broken down by soil microbes. They break apart the ring structure of the compound and release carbon dioxide in the process. Sunlight can also break down the compound (photodegradation) ([4](#)). The rate of photodegradation under natural field conditions depends on factors like light intensity and depth of incorporation into the soil.

Hexazinone does not evaporate to any appreciable extent from soil. It can leach through the soil to the root zone. It has been detected in ground water and in well water in several states at concentrations as high as nine parts per billion.

Photodecomposition, biodegradation and dilution are the prime mechanisms for loss of hexazinone activity in aquatic systems ([1](#)).

An alfalfa plot treated with hexazinone at one pound/acre had a small amount of hexazinone residue after two months. At three and six months no hexazinone or its metabolites were detected. Pineapple plants treated with hexazinone were shown to have some residue present with a half life of three months. The metabolites appeared in the bound form in pineapple, alfalfa, onions, and sorghum ([4](#)).

Exposure Guidelines:

NOEL (rat): 10 mg/kg/day

DWEL: 1.05 mg/day

HA: 0.20 mg/l (lifetime)

LEL: 50 mg/kg/day (rat)

Physical Properties:

CAS #: 51235-04-2

Chemical name: 3-cyclohexyl-6-(dimethylamino)-1-methyl-1,3,5-triazine-2,4(1H,3H)-dione

Chemical class/use: triazine herbicide

Solubility in water: 33,000 mg/l at 25 degrees C
acetone 70.9 g/100 g; hexane 0.3 g/100 g; methanol 0.265 g/100 g

Solubility in other solvents:**Melting Point:** 115-117 degrees C**Vapor Pressure:** 2×10^{-7} mm Hg**Partition Coefficient:**

BASIC MANUFACTURER

Du Pont Agricultural Products
Walker's Mill, Barley Mill Plaza
PO Box 80038
Wilmington, DE 19880-0030
Toll free: 800-441-3637
Emergency: 800-441-7515

Review by Basic Manufacturer:

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REFERENCES

1. Food and Drug Administration (1986). The FDA Surveillance Index. Bureau of Foods, Dept of Commerce, National Technical Information Service, Springfield, VA.
2. U. S. Environmental Protection Agency (1987). Health Advisory, Office of Drinking Water.
3. Beste, C.E., Chairman (1983). Herbicide Handbook of the Weed Science Society of America. Weed Science Society of America, Champaign, IL.
4. Forest Service, (1984). Pesticide Background Statements, Vol. I Herbicides. United States Department of Agriculture, Agriculture Handbook No. 633.
5. Worthing, Charles R., Editor (1983). The Pesticide Manual, A World Compendium. The British Crop Protection Council, The Ravenham Press Limited, Ravenham, Suffolk, England.
6. The Agrichemicals Handbook. 1991. The Royal Society of Chemistry. Cambridge, England.
7. U.S. Environmental Protection Agency. (1987). Hexazinone Health Advisory. Office of Drinking Water. August.